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☛ SEE ALSO PAGE 143.

New Inspection Questions.

[We shall always be glad to receive (in strict confidence) *bona fide* Inspection Questions and Drawing Examinations from our readers.—ED. *P. T.*]

TEST CARDS FOR STANDARD V.—BOYS.

No. 1

1. 15 cwt. 3 qrs. 19 lbs. at 80 guineas per cwt.
2. 4,576 articles at £54 18s. 7¼d. each.
3. A man pays 13s. 6d. tax on £429 8s. 3d.; what will he have to pay on £604 7s. 2d?
4. Make a bill for:—
   22½ yards at 8½d. per yard.
   13 pairs of gloves at 1s. 11½d. per pair.
   17 yards of flannel at 1s. 7d. per yard.
   2½ dozen collars at 7½d. each.
   24 pairs of socks at 18s. per dozen pair.

No. 2.

1. 394 acres 2 rds. 36 poles at £100 18s. per acre.
2. 9,468 articles at £19 19s. 9½d. each.
3. If 3¼ cwt. of sugar cost £13 8s. 4d., what quantity could be bought for £59 10s.?
4. Make a bill for:—
   33¾ lbs. at 11d. per lb.
   6 quarts at 3½d. per pint.
   1½ barrels at 1s. 6d. per gallon.
   3 dozen of wine at 4s. 6d. per bottle.
   24 pigeons at 3s. 9d. per pair.

No. 3.

1. 319 cwt. 3 qrs. 16 lbs. at £2 12s. 6d. per cwt.
2. What is the difference between $\frac{2}{3}$ and $\frac{7}{10}$?
3. If £51 be paid for 10 cwts. 2 qrs. 14 lbs. of sugar, what would be the cost of 2 cwt. 21 lbs.?
4. Make a bill for:—
   3½ dozen at 3s. 6d. each.
   18½ lbs. at 8½d. per lb.
   29 pairs of boots at 12s. 6d. per pair.
   550 oranges at 5 for 6d.
   17¼ yards at 9d. per yard.

No. 4.

1. 47 barrels 30 gals. 3 qts. at £45 10s. per barrel.
2. 9,094 articles at £507 13s. 7½d. each.
3. How long will a person be walking 58 miles at the rate of 22 miles in 6 hours?
4. Make a bill for:—
   33¼ stones at 9d. per stone.
   1,000 needles at 5 for 2d.
   29 lbs. 8 ozs. at 11d. per lb.
   ¾ lb. of tea at 3s. 4d. per lb.
   17 lbs. of rice at 4¼d. per lb.

No. 5.

1. 4,004 acres 3 rds. 27 poles at 11 guineas per acre.
2. 1,947 articles at £39 9s. 11¾d. each.
3. What will 43 cwt. 14 lbs. cost at the rate of 8s. 9½d. for 28 lbs.?
4. Make a bill for:—
   16½ lbs. of butter at 1s. 8d. per lb.
   3½ dozen eggs at 1¼d. each.
   7 fowls at 5s. 6d. per pair.
   5 ducks at 3s. 9d. each.
   17 lbs. of sausages at 11d. per lb.

No. 6.

1. 641 cwt. 2 qrs. 13 lbs. 11 ozs. at £89 12s. 0d. per cwt.
2. Which is greatest and which is least of $\frac{3}{4}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{5}$?
3. If 11 dozen chairs cost £99, what will 18 chairs cost?
4. Make a bill for:—
   29 coats at 29s. 6d. each.
   23¼ lbs. of beef at 11d. per lb.
   1 hhd. of wine at 14s. per gallon.
   15 dozen at 3s. 3d. per dozen.
   2,000 buttons at 6d. per score.

No. 7.

1. 29 tons 3 cwts. 3 qrs. 19 lbs. at £25 10s. 0d. per ton.
2. Reduce $\frac{1}{2}$, $\frac{3}{4}$, $\frac{7}{10}$, $\frac{4}{5}$ to fractions of the same denomination.
3. What will 34 qrs. 9 lbs. cost if 4 lbs. cost 15s. 9d.?
4. Make a bill for:—
   80 reels of cotton at 4 for 6d.
   33½ yards of flannel at 1s. 7d. per yard.
   19 gross of pins at ¼d. per dozen.
   13 shirts at 4s. 3d. each.
   16 pillows at 7s. 9d. each.

No. 8.

1. 394 tons 17 cwts. 2 qrs. 11 lbs. at £94 17s. 6d. per ton.
2. Add $\frac{1}{3}$ to $\frac{4}{5}$ and take $\frac{1}{2}$ from the answer.
3. How many weeks will a person be saving £9, if he put by 1s. 7½d. per week?
4. Make a bill for:—
   18 lbs. of sugar at 3¼d. per lb.
   23 lbs. of rice at 5½d. per lb.
   1½ lbs. of tea at 3½d. per oz.
   14¼ lbs. of coffee at 1s. 10d. per lb.
   5 ozs. of lemon peel at 4s. per lb.

No. 9.

1. 673 cubic yards 7 cubic feet 1,072 cubic inches at £589 17s. 6d. per cubic yard.
2. 7,638 articles at £594 13s. 7¼d. each.
3. If 42s. buy 12 lbs. of tea, how much will £3 11s. 9d. buy?
4. Make a bill for:—
   ½ gallon of vinegar at 3d. per pint.
   40 lbs. of soda at 5 lbs. for 6d.
   200 bundles of wood at 2 for 1d.
   19 pints of oil at 1s. 9d. per pint.
   7½ lbs. of paint at 7d. per lb.

No. 10.

1. 4,674 lbs. 13 ozs. 14 drams at £12 13s. 4d. per lb.
2. 7,344 articles at £906 18s. 10½d. each.
3. A person buys 544 yds. of cloth for £600, and sells it at £1 17s. 0d. per yard; what does he gain on the transaction?
4. Make a bill for:—
   20 pints at 1s. 9d. per quart.
   13½ lbs. at 9½d. per lb.
   1¼ lbs. at 3d. per oz.
   16 dozen at 7¾d. per dozen.
   72½ gallons at 9d. per gallon.

No. 11.

1. 29 miles 7 fur. 24 pls. at £618 12s. 8d. per mile.
2. What is the value of $\frac{1}{4}-\frac{1}{5}+\frac{1}{6}$?
3. If 3½ yds. cost £11¼, what will 28¾ yds. cost?
4. Make a bill for:—
   1¼ tons of coal at 1s. 3d. per cwt.
   18 sacks of coke at 1s. 2d. per sack.
   29 tons of coal at 29s. per ton.
   100 bundles of wood at 10 for 6d.
   4 cwt. of coal at 25s. per ton.

A Course of Object-Lessons and Elementary Science.

(Adapted to the Syllabus of the New Code and of the London School Board.)

BY RICHARD BALCHIN.

Head Master under the School Board for London.

We now come to the syllabus for Standard II. The lessons of Standard I. have dealt mainly with objects considered by themselves; with things disassociated with other things. The First-Standard mind seeks to know simply what *this* is, or what *that* is; and not how *this* is connected with or related to *that*. To perceive what any two given things are, is a mental operation prior to the conception of whatever relationship may exist between these two things. Hence the next step, and the one which will serve as the index of the work of Standard II., is mainly the 'relationship' of objects around us. So we come into the region of 'comparisons,' 'contrasts,' 'likes' and 'unlikes,' 'generalizations,' and 'classification.' All this indicates a distinct advance in mental progress from Standard I. It marks a definite mental phase not to be observed in the average First-Standard child; especially is this the case if the Second Standard consists of those bright little fellows who have just been passed up from Standard I. (upper division) of a thoroughly good infant school. Fortunate class-teacher whose division is composed of such well-trained little ones! It is the one class of a school for which the teacher obtains the largest share of credit, with the smallest amount of exertion.

Classification:—General Notions.

1. Have on the table a varied collection of objects: say, a number of different-sized nails or screws; a box containing a number of pieces of coloured chalks; a number of pieces of paper, on each of which is written either a noun or a verb underlined in a sentence; a number of pens, some new, and some too old to use. Get a boy to come out and divide the nails from the screws; another boy to arrange the nails according to their size; the screws, likewise. The boys will call this 'sorting.' Keep to the word 'sorting' for some little time and afterwards introduce the term 'classification.' Get a boy to classify the differently-coloured chalks. Then put all the slips of paper containing nouns by themselves; the rest will be verbs. This is a classification of words. This comes at the beginning of our lessons in grammar, which is the 'science of words.' When we are going to study plants, we begin by classifying them. Same with animals, and rocks, and in fact any set of objects of which we are about to learn. So lead to the conclusion that in classifying we compare and contrast, so as to decide upon the *likes* and the *unlikes*, each of our classes being formed of objects alike in some respects, but unlike those of other classes.

Classification:—The Three Kingdoms.

2. Have ready a picture of any country scene, a plant in a flower pot, and a glass of water.

Talk about the various objects on the picture, or of the things the boys have seen on their way to school, such as a horse drawing a cart, a dog running along the street, a man with a basket of flowers on his head, or in his cart. Why can't the cart go along of itself? Not alive. What is the difference between the dog and the pavement on which it runs? Many answers, giving many points of difference. Carry on a similar conversation about the picture. Lead up to the first division into two great classes, namely, dead things and living things. Introduce the words animate and inanimate. Name all the objects noted under these two heads. Then refer to the flowers, trees, etc. These live, but the life is different. For the present it will be sufficient to dwell upon these distinguishing characteristics of animal and vegetable life, viz., first, that man lives, and knows it; the flowers he is carrying live, but do not know it. Second, the animal goes in search of its food; a plant cannot do so. Place the glass of water by the side of the flower-pot. Now the plant may be dried up and dying from want of water while there is a glass of water close at hand. Now a thirsty dog would at once go and quench its thirst. So lead on to the three kingdoms of nature, viz., the animal, vegetable, and mineral. Do not at present trouble about any verbal definitions further than this: the mineral world supplies the food for the vegetable world, and the vegetable for the animal.

The Animal Kingdom.

3. Hang up before the class several pictures of different animals; if possible, the skeleton of some animal, or merely the backbone of a cat, or dog.

Talk about a worm and a slug; a herring and a snake; a bird and a mouse, with a view of arriving at the fact that some animals have bones in their bodies and others have not. By means of pictures or specimens, lead up to the conclusion that all the bones in the bony frame are connected with one central bone or line of bones called the back-bone. Describe briefly the formation of this bone. So lead to the primary classification of animals into backbone and boneless animals. Do not at present use the terms vertebrata and invertebrated.

The Vegetable Kingdom.

4. Have ready pictures of trees, or of a well-wooded landscape; specimens or pictures of the parts of a plant; also pictures of sea-weed, fungus, etc.

Talk about the pictures; compare one plant with another; contrast sea-weed with a buttercup. Lead up to the first step in the classification of plants, viz, (*a*) flowering plants; (*b*) flowerless plants. Describe briefly the main parts of a flowering plant; say, 'the wall flower.' If there is no specimen, refer to the picture. The 'root,' its form and use; the leaves, their various forms and use to the plant; the blossom, its parts, calyx with its sepals, corolla with its petals, stamens, and pistil. Do not at present use the words 'gynecium' and 'andræcium.'

THE MINERAL KINGDOM.

5. Have on the table some blocks of stone, some metal ores, metals, a hammer and cold chisel, a Bunsen burner and blow-pipe; pictures of a stone quarry and of an iron mine. Carry on a conversation about the specimens and pictures. Contrast a piece of stone with a piece of metal, say lead. Hammer both and note the difference. Chip off pieces from each and note the difference in the surfaces left. Try to melt them with the blow-pipe. Lead to the primary division in the mineral kingdom, viz., into 'rocks' and 'metals.'

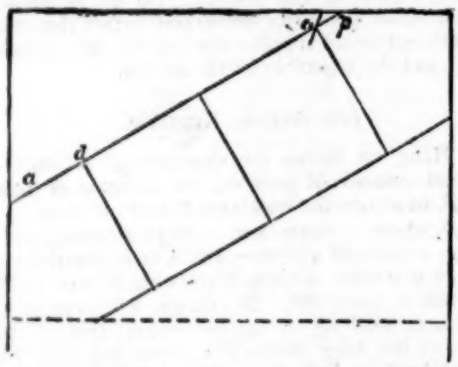
(To be continued.)

Teachers' Notes of Drawing Lessons for Standards 1. and II.*

By an Art Teacher under the London School Board.

A DIFFICULT exercise sometimes asked for by Inspectors is to draw a rectangular figure on an inclined line. This involves drawing a right angle without the aid of the vertical and horizontal edges of the slates or papers.

Refer to, and repeat Lesson XII. Standard I. then take the following exercises in their order.

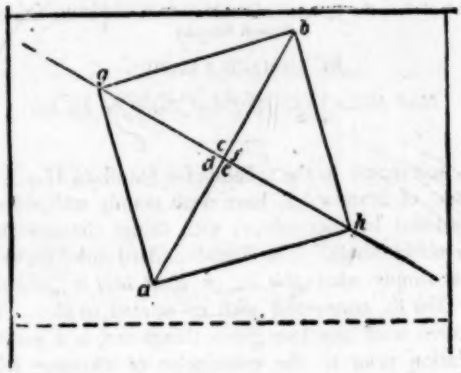


1. Draw a slanting line *ab* on the blackboard, point out where it begins and ends. 'It must not slant too much or too little.'

See that it is copied correctly before proceeding.

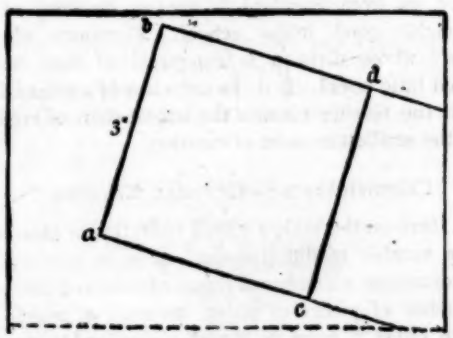
Draw a second line, slanting just as much, that is, parallel to *ab*, *about two inches* from it. The small width between the lines will render it much easier for the children to draw a line *straight across* from one line to the other at *c*, then at *d*, and lastly half-way between *c* and *d*. Point out the *square corners* formed. These are right angles. Turn the board so that the figure stands upright like a ladder. 'What sort of steps would they be if the angles were not right angles?' Illustrate on the board. 'What would the man do who tried to walk up such steps?'

2. The same figure with the line *ab* drawn downwards from left to right and the space between the parallels 3 or 4 inches.



3. Draw *ab* not reaching to the edges of the board. Divide it in the middle at *c*. Through *c* draw a line *straight across ab*, making right angles. 'Look at the four corners *c*, *d*, *e*, *f*. Are they all alike?' If so they are all square—all right angles. This will require some patience in showing and altering before a satisfactory result can be obtained.

Make *cg* and *fh* equal to each other and to *ac* and *cb*. Then all four pieces of line are alike. Join the ends of the lines to form a square.



4. Draw *ab* on blackboard, taking care to leave room for *bd*. Look round when the class have copied the line to make sure of this. At *b* make a square corner or right angle. Must be fit to be the corner of a new book, or a picture-frame. Get this right before going on. Never mind what length at present.

Draw another right angle at *a* making the line slant just as much as that from *b* so as to be parallel to it.

Rub out enough of the line from *b* to make *bd* equal to *ab*, and then make *ac* equal to *bd*. See that this is correctly done before joining *c* and *d*.

Repeat each exercise with rulers.

(To be continued.)

* The Teaching of Drawing becomes compulsory on September 1st, 1891. These articles will be specially helpful to teachers who know but little of the subject. They will teach them how to teach it successfully.

PUPIL TEACHERS' LATIN COURSE.

BY L. HUXLEY, B.A.,

Classical Master Charterhouse School.

This New Latin Course (specially written for Scholarship Candidates) was begun in our issue of February 7th (No. 4., vol. XI.).

The Imperfect of consonant and I verbs is formed by adding *-ēbam*, &c., to the stem (not *bam* as in ā and ē verbs). Thus:

Sing.	1. rĕg-*ēbam*	audī-*ēbam*
	2. rĕg-*ēbās*	audī-*ēbās*
	3. rĕg-*ēbăt*	audī-*ēbăt*
	4. rĕg-*ēbāmŭs*	audī-*ēbāmŭs*
	5. rĕg-*ēbātĭs*	audī-*ēbātĭs*
	6. rĕg-*ēbant*	audī-*ēbant*

It will be remembered that the Pres. Infinitive in a, e, and i verbs was formed by adding -rĕ to the stem, as *āmā-rĕ*. In consonant verbs -ĕrĕ is added, as *rĕg-*, rule, Infin. *rĕgĕrĕ*.

The Future of a- and e- verbs is formed by adding -bō, -bĭs, -bĭt, -bĭmŭs, -bĭtĭs, -bunt to the stem.

		A- STEM.	E- STEM.
Sing.	1.	ămā-*bō*	dŏcē-*bō*
	2.	ămā-*bĭs*	dŏcē-*bis*
	3.	ămā-*bĭt*	dŏcē-*bĭt*
Pl.	1.	ămā-*bĭmŭs*	dŏcē-*bĭmŭs*
	2.	ămā-*bĭtĭs*	dŏcē-*bĭtĭs*
	3.	ămā-*bunt*	dŏcē-*bunt*

EXERCISE XI.

Valerius Corvus.

1. Gallī quondam Rōmānīs bellum inferēbant. 2. Dum duae ăciēs prō castrīs ăd proelium părātae stant, Gallus statūrae maximae et torvae faciēī, in mĕdium prōcēdĕbăt. 3. Scūtum (n.) hastā quătiebat, et silentiō ĭtā factō, unum ex Rōmānīs ad pugnam prōvŏcābăt. 4. Nĕquĕ Rōmānī rēcūsābant, nam Marcŭs Vălĕrĭŭs adversŭs Gallum in mĕdium armātŭs prōcēdĕbat.

Translation.—1. The Gauls once made war upon the Romans (dat. of ind. obj.). 2. While the two lines-of-battle were standing (*dum* is regularly constructed with the present indic.) before the camp ready for battle, a Gaul, of very great height and grim face, advanced into the middle. 3. He struck his shield with his spear, and, silence being thus made, he challenged one of the Romans to fight. (*Silentio facto*, an adverbial phrase, made up of a subst. and a participle—or adj.—in the ablative case. It is called 'ablative absolute,' *i.e.*, *detached* from the construction of the main verb.) 4. Nor did the Romans refuse, for Marcus Valerius advanced armed into the midst against the Gaul.

Retranslate into Latin.—1. The Gauls bore-down (*Sī* [acc.] *inferr-*) upon the Roman line (what case?). 2. Marcus, being-challenged (*prōvŏcāto-*) to fight, struck with his sword (*gladio-*, m.) the shield of a Gaul of great height. 3. Both (*et*) the Gaul and the Roman advanced armed (what number?) into the midst between (*inter* with acc.) the two lines.

EXERCISE XII.

1. Dŭō armātī in mĕdiō destĭtūti sunt, spectācŭlī (n.) mōrĕ māgis quam bellī. 2. Spĕcĭē vērō vix ex aequō pugnābant. 3. Nam Gallŭs statūrā eximiā Rōmānō immĭnēbat; pictīs et auro cnelātīs armīs fulgēbăt. 4. Rōmānō mĕdiă ērăt statūrā, et mŏdĭcā in armīs spĕcĭēs.

Translation.—The two armed (champions) were left alone in the midst, in-the-fashion of a spectacle rather than of war (*mōrĕ*, a 3rd decl. abl.). 2. In appearance indeed they scarcely fought on equal terms (*ex aequo*, from equal position). 3. For the Gaul, with his exceeding height, towered over the Roman (dat. *immine-*, a compound intrans. verb, has no direct object), he shone with armour painted and inlaid with gold. 4. The Roman was of (lit., There was to the R., dat.) middle height, and moderate display in his armour.

Retranslation into Latin.—1. On the third (*tertio-*) day (abl.) the Roman fought with (*cum* + abl.) the Gaul. 2. He (*Is*) on account of (*propter* + acc.) moderate height, was able to strike the Gaul below (*sub* + acc.) the shield (*scuto-*, n.) with (his) sword (*gladio-*). 3. The Gaul's inlaid armour (n.) and gold (n.) shine. 4. The Roman wished to despoil (*spŏlia-*) the dead (*mortuo-*) Gaul of his inlaid armour (*of* expresses separation, hence *abl.*).

EXERCISE XIII.

1. Sĕd Romānō in proelium ēgressō, corvus rēpentĕ in galeā considēbăt, in Gallum versus. 2. Hōc primō Valĕrius augŭrium caelō missum pŭtābăt. 3. Hīc corvŭs, quotiēs pugnā Initā est, se ālīs lĕvābăt, ŏcŭlōsquĕ Gallī rostrō pĕtēbăt, dōnĕc territum ĕt paenĕ caecum Valĕrius obtruncăt. 4. Indĕ Valerio cognōmĕn Corvī inter jŏcōs k e·ōrum Rōmānōrum addĭtum est.

Translation.—1. But as the Roman went forth into battle, a raven suddenly settled upon his helmet, facing towards the Gaul. (*Rōmānō*, dat., as the person indirectly affected; *egresso*, pf. part., deponent. Tr. literally: To the Roman going forth; *versus*, 'turned,' pf. pass. part.) 2. This at first Valerius thought an augury sent from heaven. (*Hoc*, neut. sing. demonstrat. from *Hīc*.) 3. This raven, as often as the fight was begun, raised itself with its wings (*ala-*) and assailed the eyes of the Gaul with its beak, until (*dōnec*) Valerius cut him down, terrified and almost blind. (*Peto*, to seek, make for, aim at; *rostro petere* = to peck at.) 4. Thence the surname of Corvus was added to Valerius amid the jests of the rejoicing Romans. (*Valerio*, dat. ind. obj., esp. as *recipient*. *Cognomen*, a 3rd decl. neuter.)

Retranslation into Latin.—A raven flew down (*dēvŏla-*) from the sky (*caelo-*, n.) and settled upon the shoulder (*hŭmĕro-*) of the dead (*mortuo-*) Gaul, stretched (*strāto-*) on the ground (see note on o- decl.), and pecked at his eyes. 2. But the dead-man's hound (*cānālo-*), which (*qui*) loved its master exceedingly (*maximē*), ran up (*accurr-*) and barked (*latra-*) and scared (*terre-*) the raven. 3. Valerius gave (*dă-*) the hound food (*cibo-*, m.); afterwards (*postea*) he buries (*sēpĕli-*) the Gaul, and takes (*porta-*) the hound home (*dōmum*—no preposition) with him. (*Cum* follows the personal pronouns: *mecum*, *tecum*, &c.)

Second Decl. (*contd.*) STEMS in -ro.

Of stems in *ĕro-*. (1) Most drop the *-us* in N.V. sing. (2) Many omit the *e* before *r* in all cases except N.V. sing.

The exceptions to (1) are about a dozen in number. The commonest are: *numerus*, number; *humerus*, shoulder; *juniperus*, juniper; and adjectives: *prŏpĕrus*, hasty; *prosperus*, prosperous; *ceterum*, the other; *posterum*, last (neither in Nom. M. Sing.).

EXAMPLES:	*puer* (m.), boy;	*vir* (m.), man;	*ager* (m.), field;	*ārātrum* (n.), plough.
Sing. N.V.	puĕr	vīr	ăgĕr	ārātr-*um*
Acc.	puĕr-*um*	vīr-*um*	ăgr-*um*	
G.	puĕr-*ī*	vīr-*ī*	ăgr-*ī*	ārātr-*ī*
D.Abl.	puĕr-*ō*	vīr-*ō*	ăgr-*ō*	ārātr-*ō*
Pl. N.V.	puĕr-*ī*	vīr-*ī*	ăgr-*ī*	ārātr-*ă*
Acc.	puĕr-*ōs*	vīr-*ōs*	ăgr-*ōs*	
G.	puĕr-*ōrum*	vīr-*ōrum* (and vīr-*um*)	ăgr-*ōrum*	ārātr-*ōrum*
D.Abl.	puĕr-*īs*	vīr-*īs*	ăgr-*īs*	ārātr-*īs*

Publications Reviewed.

Natural History Plates. Edinburgh and London: W. and A. K. Johnston.

To the four plates which are now under our critical notice we are able to accord our hearty commendation. They have for their respective subjects the Leopard, the Gazelle, the Flamingo, and the Wild Duck; and they are equally satisfactory whether viewed as accurate illustrations of animal life or as specimens of artistic and lithographic skill. It would probably be difficult to point out any department of industrial art which has shown more steady progress of late years than art as applied to the purposes of education. No retrogression or diminution of this progress is at any rate to be noticed in reference to these plates; and we are also glad to note in them nothing to lead one to suppose that they are of continental origin. We confess—and in so doing we do not think we incur a suspicion of being absurdly patriotic—that in connection with publications of this nature we much prefer to find the imprint of a British firm as producer and manufacturer to seeing the far-too-frequently-met-with words 'Made in Germany.' It should be mentioned that to each plate is appended a few lines giving in a concise manner all the information necessary for imparting a satisfactory knowledge of the object illustrated.

Notes on Shakespeare's Plays. King Lear and Coriolanus. By T. Duff Barnett, B.A. London: George Bell and Sons.

Mr. Duff Barnett has added two more to his excellent series of notes on Shakespeare's Plays. These, treating of King Lear and Coriolanus, are marked by all the features which have secured approval for their predecessors—brightly written introductions, almost exhaustive information carefully classified, brief pointed notes based on the highest authorities, special attention to prosody and philology. The text is not included, but these notes may be used with advantage as companions to any edition of the plays.

Peter's Paradise: a Child's Dream of the Crystal Palace. By G. H. Robinson. London: Simpkin, Marshall and Co. (Lim.).

We heartily congratulate Mr. Robinson on the issue of this picturesque and attractive souvenir of the Crystal Palace. It is an ideal coloured picture-book for the young, and happy indeed will be the youngster who gets it.

Mr. James Denholm contributes the illustrations, which are admirably done, and true to the life, as we ourselves can testify. The volume is printed in Messrs. Hazell, Watson and Viney's best style.

Visitors to London bent on delighting the hearts of their little friends should buy this dainty, artistic, and altogether charming book. It costs but a shilling.

Chambers's New Geographical Readers: Standard III., England: and Standard VI., British Colonies and Dependencies. London and Edinburgh. W. and R. Chambers.

Many as are the series of Geographical Readers in the school-book market, we find in these two volumes a freshness and brightness that must commend them to teachers. The lessons are much more like good reading lessons than is often the case in books of this class. Too often the lessons have the appearance of pages of text-book, slightly expanded and printed in continuous paragraphs. Here we seem to have the results of actual observation, and the author turns aside occasionally to dwell on the interesting subjects suggested by the places mentioned. Thus in the Third Reader we have an interesting chapter entitled 'How Alpaca became Useful,' with an admirable account of Titus Salt, the founder of Saltaire. The lessons on 'Holiday Rambles,' on Lighthouses, Railways, and 'Our Letters,' are specially worthy of mention, as well as the two on 'Horatio Nelson,' and 'Robert Clive.'

In the Sixth Reader, the lessons take the form of imaginary voyages and travels to and about our various foreign possessions. Many of the descriptions have the vividness which distinguishes the narration of actual experience.

Both volumes are well illustrated, and several small maps are inserted in the text. Of the maps, however, two or three, particularly those of Malta, Ceylon, and the Ganges Delta, seem to be rather crowded, and so likely to confuse children. In nearly every respect the books deserve the warmest commendation.

Chambers's Expressive Infant Reader. London and Edinburgh: W. and R. Chambers.

This little book is issued as introductory to the series of 'Expressive Readers,' recently published. Its chief features are bold type, cheerful little stories of childish experiences, pleasing illustrations, and the usual spelling lists and script copies for writing lessons. We can recommend this book to Infant Teachers, but it is little, if any, easier than many books provided for Standard I.

Euclid's Elements of Geometry. Books III. and IV. By H. M. Taylor, M.A. London: C. J. Clay and Sons.

This edition of Books III. and IV. is marked by all the neatness, care, and judgment which were so noticeable in the treatment of Books I. and II.

The changes introduced are very considerable; the order of the propositions has been occasionally altered, and the proofs simplified and shortened. Additional propositions are freely used. There is a useful and well-arranged set of exercises. The book is one to be confidently and cordially recommended.

Entertaining Readers for Standards I. and II. By George Beach, M.A., LL.D. London: Joseph Hughes and Co.

The title adopted for Dr. Beach's new series of reading books is thoroughly justified by their special merits. The matter is almost entirely new, having been written expressly for these books. This originality in itself is a point of little moment, but when we find that every lesson deals with such topics as interest young children, and that the language used is well within their comprehension, we are bound to admit the claims of the series on the attention of teachers in want of suitable reading books. It would be unfair to expect genuine original poetry in readers for very young children, but the comic rhymes and stories in verse which Dr. Beach includes are sure to prove attractive and amusing to those who read them.

A few instructive lessons are given on such subjects as Drawing, Grammar, Geography, and Coins. The script lessons, and spelling lists printed in white on a black ground, are likely to attract attention.

We cannot speak too highly of the material features of the volumes. A tasteful artistic design adorns the cover, the type is remarkably clear and bold, the woodcuts are numerous and delightfully amusing. Wherever these books are used, we anticipate that the reading lesson will be welcomed by the children as a 'real good time.'

NOTES OF A LESSON ON 'LIGHTING A FIRE.'

BY MRS. W. H. WIGLEY,

Teacher of Method at the Cheltenham Training College for Mistresses.

Standard II. (Girls)—Time, thirty minutes.

The children should be placed so that a fireplace or stove may be in front of them. There should be provided, a pair of rough gloves for the hands, some paper, wood, coal, and matches. Also a small piece of candle, a plate, and a wire meat-stand, or its substitute, and a glass tumbler and some burnt rag for tinder.

HEADS.	MATTER AND METHOD.	B. B. SUMMARY AND ILLUSTRATIONS.
Introduction	The teacher to remind the children that some day they may have to be mother's best maid, and light the fire for her. To tell them that to light a fire nicely needs some clever management. All fires that are lighted do not burn. Very often they '*go out.*'	
I. The materials to be used.	Get the children to name the things that will be needed in lighting a fire; paper first, then wood, and coal—that the wood must be dry. Why? That we must have large and small pieces of coal. Why?	Write the names of these materials on B. B.
	Tell the children that in places where there is no coal people have to burn wood, or peat, or oil. Lead them to see that nothing else makes so good a fire as coal.	If possible, show specimen of peat-turf.
	Draw their attention to the matches. Ask what people used to do before matches were invented. Describe the old process with the tinder-box and the flint and steel. Show its inconvenience and uncertainty.	Show a piece of tinder on a plate, put a spark to it, and light a match at the spark.
II. Flame will not burn without air.	The teacher next to put the piece of candle on the plate, and light it, and to turn the glass down over it; the children to watch it carefully as the flame grows dimmer and dimmer, and at last dies out. What has the candle done? Why did it go out? The teacher to repeat the process, but just before the flame would expire, to raise the glass and admit the air, and lead the children to note how quickly the flame revives again. To do this once or twice until all see that when the glass is close down over the flame it must go out.	Illustrate by means of candle and glass.
	Then the candle should be placed on the wire bars of the stand, and covered with the glass. What is the candle doing now? What did it do when it was on the plate? Why does it burn brightly one time with the glass over it, and go out another time? Lead the children to see that the flame gets something on the stand which it does not get on the plate. What is it that it gets?	Illustrate with the candle and stand.
	What is there all round us in the room? Why do we want all this air? What would happen to us if we could not get air to breathe? Let two of the children take the plate and the stand. Let one hold her hand up while the other blows against the plate, then against the stand. Let her tell what she felt against her hand in the latter case. Then question the children thus: Why did not the breath pass through the plate? Why did it pass through the stand? etc. Then place the lighted candle again on the plate and stand, and cover it, leading the children once more to watch the result. Why does it burn under the glass at one time and not at another? Why can the air get to the flame now? What does the flame need to keep it burning? If we put a little bird on the plate under the glass, what would happen to it? Why would it die? What happened to the flame? Why did it go out? Let the children read the words on blackboard two or three times.	Write, 'A flame will not burn without air.
III. How to lay the fire.	Draw the children's attention to the front and bottom of the grate—bars and open spaces—plenty of room for the air to get through. Then proceed to lay the fire *the wrong way*—to squeeze down the paper, press on the wood close together, and pack in the coal. Ask the children's opinion of the work done, and get them to point out the errors. Then proceed to lay the fire the right way—letting some one or two help—or do it entirely under criticism. Let the paper be crumpled, the wood laid loosely across and across, and the coal arranged so that the air can draw between it. Let one of the children set a light to it, and notice how bravely it burns.	The fire to be laid the wrong way. The fire to be laid properly.
IV. Recapitulation.	Why did not the candle burn under the glass? Why did not the fire burn when we packed the wood and coal close? What does a flame want to make it burn? How do we sometimes force the air in among the coals to make a good fire? Who has ever blown the fire? Why does a fire burn well when it is blown? What must we always remember in laying a fire? Why must we do this?	

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THE METRIC SYSTEM, AND HOW TO TEACH IT.

BY CHAS. BOWDEN.

At intervals of a few years the *Metric System* appears in the Code as a part of the work to be done in Arithmetic in our schools. Since the passing of the *Metric Act* in 1864 that has been the case, but no practical steps have been taken to bring about the necessary change from our antiquated, cumbrous system of weights and measures to the easy decimal system which is now in use in every country in the world except our own and some of our dependencies.

In the Code of 1871 we have these words: 'In all schools children in Standards V. and VI. should know the principles of the Metric System, and be able to explain the advantages to be gained from uniformity in the method of forming multiples and sub-multiples of the unit.' These words remained in the Code several years; teachers applied themselves diligently to teaching the advantages of the Metric System, but as no use was ever made of the knowledge, the subject dropped out of the Code.

The words have been re-inserted in the Code for 1891—with this addition: 'As a preparation for this it will be useful to give in Standard IV. elementary lessons on the notation of decimal fractions.' Standard VII. is also included in the list of those to be taught the system.

The wisdom of requiring the subject to be taught so long as there is no reasonable prospect of the adoption of the system may be doubted, but 'needs must' when the Education Department drives. Perhaps the combined efforts of the Decimal Association, the Chambers of Commerce, the National Union of Teachers and the Trade Societies, who have all joined in a demand for the change, may be productive of good in the near future.

The *Metric System* derives its name from the French word *metre*, which is a measure of length (of a little more than 39 inches), and is supposed to be the ten millionth part of the distance from the pole to the equator. It is sometimes called the *Decimal System*, from the principle underlying it.

That principle is—that having fixed upon a unit, ten units of any one denomination make one unit of the next higher denomination, just as in the notation of simple numbers. For example, in the United States of America, the *dollar* is fixed upon as a unit, and is subdivided into 10 *dimes*, a dime into 10 *cents*, a cent into 10 *mills*. A sum of money can at once, therefore, be expressed in terms of any other without reduction: thus—4 dollars, 6 dimes, 8 cents, 5 mills may at once be written 4 dols. 685 mills, or 46 dimes 85 mills, or 468 cents 5 mills, or 4,685 mills.

Compare this with our cumbrous method of reducing a mixed sum of money to farthings by multiplying successively by 20, 12, and 4.

It will be obvious that all the operations in the compound rules, whether of money or weights and measures, can thus be performed as easily as in simple abstract numbers. After once teaching notation therefore, it would only remain to give names to the different figures, and no further work would be needed in teaching all the compound rules.

The advantages to be gained by the adoption of such a system are apparent, but may be briefly stated here for use on the blackboard in class teaching:—

(*a*) The time now spent in learning tables, and in practising their use would be saved, and might be devoted to better purposes.

(*b*) The teaching and learning of so many varied tables is an unnecessary tax on the time and memory of teachers and scholars.

(*c*) Compound calculations of every kind would be much simpler.

(*d*) Commercial transactions would be less complex, and time would be saved in trade as well as in school.

Objections may be raised by some to any change, on the score of inconvenience, trouble and expense. To this it may be answered that emigrants to countries, where a decimal system exists find little trouble in adapting themselves to the change; that in Canada a decimal coinage was easily adopted, and in Germany, our greatest European rival in trade, one both of money and weights and measures. As to expense, the time saved in the future would amply repay the extra present cost. Two methods have been suggested for adopting a decimal coinage in England, one with the sovereign as the unit, and one with the farthing as the base. If the sovereign were adopted all the calculations in great mercantile transactions involving sums of large amounts would suffer little alteration; the alteration in values would be in the fractions of the pound, the silver coins and the pence only. The adoption of the farthing as the standard would cause least inconvenience to the poorer classes, but would require alteration in the intrinsic value of gold coinage, and all amounts involving pounds would need alteration. The introduction of the silver coin—the florin, was the first step towards a decimal system in England; the recent introduction of a double florin is another. The system with the *pound* as the unit, which is most favoured, divides it into 10 florins, each florin into 10 cents, each cent into 10 mills. The changes in the coinage would be in the value of the sixpence, threepence, and the copper coins. The table would read—

10 mills = 1 cent.
10 cents = 1 florin.
10 florins = 1 pound.

Whichever of these was taken as the unit it would be perfectly easy to express any sum in terms of either of them without difficulty. For example, 4,972 mills = 497 cents 2 mills = 49 florins 7 cents 2 mills = 4 pounds 9 florins 7 cents 2 mills.

The reverse process is just as readily performed.

In France the unit for the money coinage is the *franc*, a coin worth about 9¾d. of our money.

The franc is divided into 10 decimes, and a decime into 10 centimes.

But just as in America you seldom hear of *dimes* and *mills* only of dollars and cents, so in France the coins most heard of are francs and centimes; 100 centimes making a franc. For coins they have 1 centime, 2 c., 5 c. (called a *sou*, and worth about an English halfpenny), 10 c. (a decime, but oftener called *two sous*), in copper. In silver there are 20 c., 50 c. (half a franc), 1 fr., 2 fr., and 5 fr.; and in gold, 5 fr., 10 fr., 20 fr., 40 fr., 50 fr., & 100 fr.

(To be continued.)

The 1891 Scholarship Examination.

BY DR. GEORGE BEACH, M.A.

Co-Author of 'A Manual of our Mother-Tongue,'

Author of 'Elements of English,' 'Entertaining Readers.'

1. In order to meet the wishes of various correspondents, in the remainder of these articles attention will also be paid to those points of the SCOTCH Code divergent from the English.

2. Several of our readers have complained that they cannot find in their Geographies the names of the thirteen States of America that revolted against the mother country in 1776.

These are: *New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina,* and *Georgia.*

The names of *New Hampshire* and *New Jersey* sufficiently explain their derivations. *New York* was named after James II., when Duke of York; *Connecticut* and *Delaware* (Lord Delaware), after two rivers; *Pennsylvania,* from William Penn, the Quaker; *Maryland,* from Henrietta Maria, wife of Charles I.; *Virginia,* from Queen Elizabeth; *North* and *South Carolina,* from Charles IX., of France, and our Charles II.; and *Georgia,* after George II.

Virginia is now divided into Virginia and West Virginia; Massachusetts was at first composed of two colonies, viz, Plymouth Colony and Massachusetts Bay Colony, which were united in 1692. The first English colony within the limits of the Union was settled in Virginia in 1607. In 1613 the Dutch founded New Amsterdam, but being expelled by the English in 1674, the name was changed to New York. An expedition from this colony founded New Jersey in 1617. In 1620 the Pilgrim Fathers, in the 'Mayflower,' landed at Plymouth, and also settled at Massachusetts Bay, in 1629. New Hampshire was colonised in 1623 by Edward and William Hilton; and Roger Williams, forced to fly from Puritan persecution, founded Rhode Island in 1636. Meanwhile Maryland had been settled by the Romanists under Cecilius, Lord Baltimore, in 1634, Connecticut from Massachusetts in 1633, and the Swedes had established a colony called Nova Suecia (now Delaware) in 1627.

Virginia in 1650, and Massachusetts in 1661, sent forth emigrants to North Carolina, who with others spread in 1670 to South Carolina. The Quaker William Penn sought religious tolerance in Pennsylvania in 1682, and lastly General Oglethorpe founded Georgia in 1723.

From the above data it can be easily seen how varied were the nationalities and how numerous the religious sects that sought in the New World civil or religious freedom.

3. SUM 6, p, 92 OF THE 6TH NUMBER.

A square field contains 21 a. 3 rds. 1 po. How long will it take a man to run round the boundary at the rate of $7\frac{1}{2}$ miles an hour?

L = 59 poles

Area = 21 a. 3 r. 1 po. = 3481 sq. po.

Perimeter of square = $\sqrt{3481}$ sq. poles $\times$ 4
= 59 po. $\times$ 4 = 236 po.

Time required to run $\frac{1}{4}^{0}$ miles = 60 mins.
,, ,, 2400 po. = 60 ,,
,, ,, 236 ,, = $\frac{60 \times 236}{2400}$ m. = $5\frac{9}{10}$ m. Ans.

4. *Sum '1 b,' p. 92 of the 6th Number.*

Determine c and d so that in the product of $x^2 + x + 1$ and $x^3 + cx^2 + dx + e$, the co-efficients of x^4 and x^3 may vanish.

$(x^2 + x + 1)(x^3 + cx^2 + dx + e) = x^5 + (c + 1)x^4 + (c + d + 1)x^3 + (c + d + e)x^2 + (d + e)x + e$.

$\therefore (c + 1)$ being the co-efficient of x^4, and $(c + d + 1)$ being co-efficient of x^3, in order for these to vanish, the following equations must be true:—

$(c + 1) = 0$, $\therefore c = -1$, and
$(c + d + 1) = 0$, $\therefore (-1 + d + 1) = 0$, $\therefore d = 0$.

This may be easily tested by substituting the obtained value, when the expression becomes

$(x^2 + x + 1)(x^3 - x^2 + e) = x^5 + (e - 1)x^2 + ex + e$,

and in the product the terms x^4 and x^3 have vanished.

WEEK COMMENCING 16TH MARCH 1891.

DAYS.	FIRST HOUR.	SECOND HOUR.	THIRD HOUR.
M.	Quadratic Equations *or* Questions on Needlework	Dates and Battles	Latin *or* French
TU.	Euclid up to I. 41, *or* Any Needlework	Political Map of Australia	Science
W.	Theory of Proportion	Drawing	Analysis and Parsing
TH.	Algebraic Factors *or* Savings and Investments	From 1830 to 1843	Latin *or* French
F.	Deductions up to Euclid I. 41, *or* Any Needlework	Political Geography of Australia	Greek Affixes and Prefixes
S.	Square and Cube Root Interest	Repetition and Macaulay's Essay on Madame D'Arblay	Notes of a Lesson on Forests. How to tench reading	Science

REMARKS ON ROUTINE.

(*a*) QUADRATIC EQUATIONS.

Hamblin Smith, pp. 174 to 184, Examples LXXXV. to XC., sums 1 and 2 in all.

Charles Smith, pp. 155 to 165, Examples XLIII. to XLV., sums 1, 2 and 3 in all.

Todhunter, pp. 160 to 168, Example XXVI., sums 1, 8, 12, 15, 22, 26, 30, 37, and 41.

ALGEBRAIC FACTORS.

Hamblin Smith, Examples XVII. to XXVII., sums 7 and 8 in all.

Charles Smith, Examples XXII to XXVIII. sums 9, 10, and 11 in all.

Todhunter, Example XV., sums 22 to 40.

(*b*) EUCLID.

Deighton.—(1) pp. 58 to 70. (2) p. 61, Ex. 15, p. 62, Ex. 1, 2, and 3, p. 65, Ex. 2 and 3.

Todhunter—(1) pp. 38 to 43. (2) p. 346, Ex. 75, 80, 82, 85, 87, 92.

SCOTCH CODE.—Prop. 10 to 18 of Book III. in addition.

(*c*) ARITHMETIC.

Pendlebury—(1) pp. 304 to 307, Ex. CLXXXVIII. to CXC., sums 1, 3, 6 in each.

Hamblin Smith—(1) pp. 104 to 107, Ex. LIX. to LXI., sums 1, 3, 6 in each.

Barnard Smith—(1) pp. 274 to 281, Ex. LXIX., sums 8 to 12.

Dixon and Beach—(Females) (1) Study pp, 151 to 160.

(2) Both Males and Females should study the Theory of Ratio and Proportion.

(*d*) HISTORY.

Curtis, p. 46, and half p. 47.
Sanderson—(2) pp. 375 to 385.
Ross—(2) pp. 430 to 446.
SCOTCH CODE. From Egbert to Harold II.

(*e*) GEOGRAPHY.

Moffatt and Paige—(2) pp. 189 to 192.
Anderson—(2) pp. 200 to 203.
SCOTCH CODE as English, with Physical Geography of Rivers.

(*f*) ENGLISH.

(1) Analyse fully the following lines, and parse the words printed in italics :—

'There at the foot of *yonder* nodding beech
That wreathes its old fantastic roots so *high*,
His listless *length* at noontide *would he stretch*
And *pore* upon the brook that babbles *by*.'

(2) *Dr. Beach's* 'ELEMENTS OF ENGLISH,' pp. 185, 186, and p. 200.

(*g*) LATIN.

Read Mr. Huxley's Article and first *twelve* chapters of 'De Bello Gallico.'

FRENCH.

Professor Darquet's Course, pp. 71 to 80, and pp. 15 to 19 of '*La Jeune Sibérienne*.'

(*h*) SCHOOL MANAGEMENT (Females).

Give a sketch of the graduated lessons in needlework, up to Standard III. inclusive, which you think suitable for children in a mixed school (girls and infants), the requirements of the Code being fulfilled.

(*i*) HUGHES' DOMESTIC ECONOMY.—pp. 413 to 421.

SELECTED GOVERNMENT QUESTIONS.

1. In a rectangular garden 40 yards long, 30 yards wide, a path 5 feet wide is made running round the sides, and there are four circular flower-beds, each 28 feet in diameter. How much will it cost to cover the rest of the space with grass at 7½d. per square yard? (*Males.*) $\pi = 3\frac{1}{7}$. Ans £22.

2. Solve the equations—

(1) $\frac{2x+7}{26} - \frac{x-8}{39} + \frac{x}{13} = 1\frac{1}{2}$

(2) $\left.\begin{aligned} \frac{11x}{9} &= y - 2 \\ \frac{x}{3} - \frac{y}{13} &= 2 \end{aligned}\right\}$ Ans. 8 $x=9$, $y=13$

(3) $\frac{3x}{x-2} + \frac{x-1}{x-5} = 8$ 3 or 6⅓.

3. The accounts of a school showed a debt which was paid off by three managers—A, B and C.

A paid half the debt and £2 more, B paid half the remainder and £7 more, C paid half of what then remained and £8 more, which just cleared off the debt. What did each pay?

Ans. A, £50; B, £30; C, £16.

4. (*a*) Subtract 107 from 305, clearly explaining the process, as to a class of young children.

(*b*) Prove that $\frac{3}{4} \div 9 = \frac{1}{12}$.

(*c*) Prove the rule for finding a vulgar fraction equivalent to ·345.

(*d*) Define Compound Interest, Stocks, Proportion, Mean Proportional, giving examples.

5. In what time will £3,200 amount to £4,460 at 3½ per cent. per annum (simple interest)? Ans. 11¼ years.

6. If a straight line falls on two parallel straight lines, it makes the alternate angles equal to one another, and the exterior angle equal to the interior and opposite angle on the same side; and also the two interior angles on the same side together equal to two right angles.

7. P is a point between two given parallel straight lines, such that any two straight lines drawn through P always intercept equal portions of the parallel straight lines. Show that P is equidistant from the parallels.

8. (*Scotch Code.*) If two chords of a circle intersect at right angles, the sum of the squares on their segments is equal to the square on the diameter of the circle.

9. Sketch *briefly* the history of English colonisation.

10. What do you know of Parliamentary reform and the religious movements of the eighteenth century.

11. (*Scotch Code.*) Give a short account of the Danish invasions of Britain.

12. Draw rough maps of Victoria and Western Australia.

13. Enumerate the Colonies of Australia, giving three towns, one river, and the occupations of each.

14. (*Scotch Code.*) Mention the principal ocean currents, and describe the course of the Gulf Stream.

15. Write a short essay on the use of pictures in teaching.

16. Give some rules for determining the *case* of relative pronouns in a sentence, and give four examples containing relative pronouns in different *cases*.

17. What is meant by style and expression in Reading, and how can these be best taught?

18. Write a Smallhand copy of 'Health is the parent of happiness.'

Write a Largehand copy of 'Trigonometry.'

CORRESPONDENCE.

BOIS-GILBERT. — Walker Overend's 'Elements of Human Physiology,' Hughes, 2s. 6d.

AN ENQUIRER.—Only once more we believe. We think you must. On both these points there is some conflict of opinion. If your Correspondent will write to the Department he will get a positive answer.

J. D.—Our space is very limited, but we will carefully consider whether we cannot meet your wishes.

F. R.—Lotze's 'Outlines of Psychology,' and Sully's 'Psychology.'

J. W. H. (Harrogate), R. J. L. (King's Lynn), J. C. W. (Strichen), J. W. (Congleton), J. F. (Berwick), M. O. (Dartford), L. T. E. (Dundee), B. A. N. (Stockport), S. U. (Southport), D. N. (Retford), 'O' (Blackpool), T. T. (Hastings), SMILE (Canterbury), answered per ordinary letter.

(To be continued.)

Publications Received.

BELL, G., AND SONS.—Notes on Shakespeare's Play of Coriolanus (*Duff-Barnett*).

CASSELL AND CO, LIMITED.—Cassell's Storehouse of General Information, Part II; Popular Atlas.

CURWEN AND SONS.—Cantata: The Little Gipsy (*Geibel*). Operetta: Jack Frost (*Tisdale and Vinge*).

FISHER UNWIN AND CO.—The Century Illustrated Monthly Magazine. March.

MACMILLAN AND CO.—Warwick the King Maker (*Oman*).

PHILIP, G., AND SON.—Child Life, Vol. I., No. 3.

SIMPKIN, HAMILTON AND CO.—Curtis's Educational Series: The New School Arithmetic.

SMITH, ELDER AND CO.—The Cornhill Magazine. March.

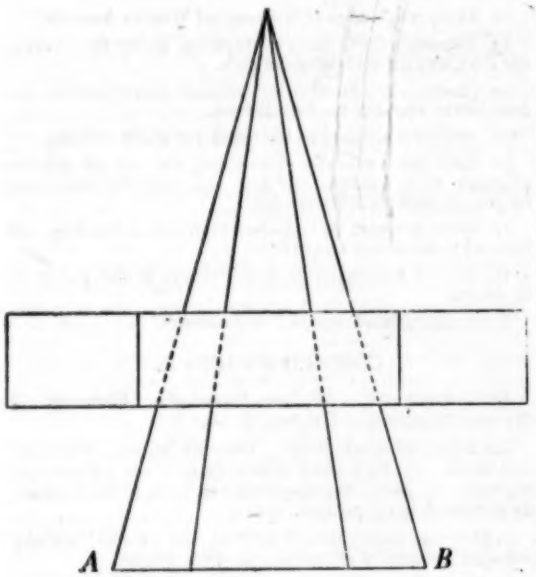
Practical Perspective for Pupil Teachers.

BY

E. G. BAKER, B.SC., B.A.,

Vice-Principal of the Training College, Carmarthen.

EXERCISES.—Scale ½ in. to 1 ft.. Height of spectator's eye above the ground plane, 6 ft.; distance of spectator from the plane of projection, 10 ft.



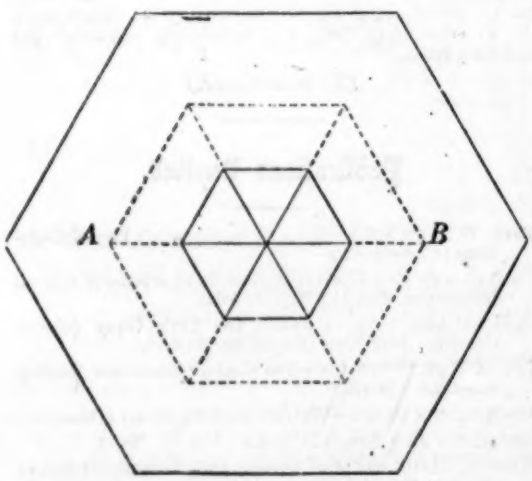


Fig. 75.

4. In fig. 75 are shown the plan and an elevation of a right hexagonal pyramid piercing a horizontal hexagonal slab. Place the solids in perspective, so that the corner A of the base of the pyramid may be 1 ft. to the left and 5 ft. in the picture, and the diagonal AB recede from the picture plane towards the right at an angle of 10°.

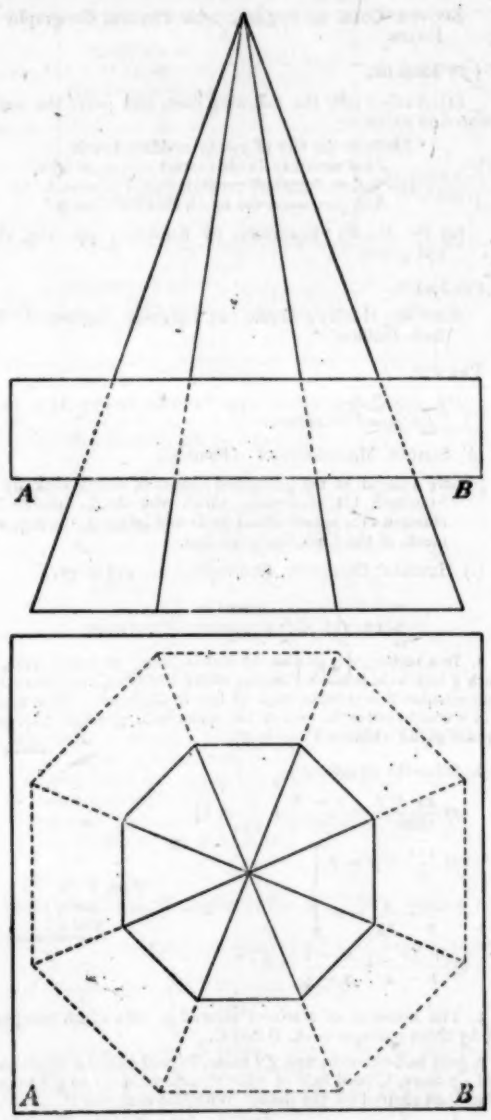


Fig. 76.

5. Place in perspective the right octagonal pyramid and square slab represented in plan and elevation in fig. 76. The centre of the base of the pyramid is to be 2 ft. to the left and 5 ft. in the picture, and the edge AB of the slab is to recede from the picture plane towards the right at an angle of 80°.

(To be continued.)

INSPECTION OF A BOARD SCHOOL.

As this was the first examination under the new order of things, the teachers were anxious to know the methods adopted by H.M. Inspector. All scholars whose names formerly went on the exception schedule were entered on the examination schedule as Standard o. All scholars who had been less than six months in the school had an asterisk opposite their names.

The entire school was examined by sample. Before the arrival of the Inspectors the teachers had divided their classes into three equal divisions, having some of the best, worst and average scholars in each group. This plan worked well, and was a fair test of the condition of the school.

Standard IV. had Dictation from an unknown book, and part of Standard V. from a newspaper. Only Standards II., IV. and VI. were tested in Grammar, Standards I., III., V. and VII. being tested in Geography. On these results the whole school was assessed in these subjects.

The Girls' Needlework in Standards I., III., IV. and VI. was tested, but all garments were carefully examined.

The Reading in Standards VI. and VII. was examined from an unknown book, brought by Inspector, entitled 'Great Authors,' by Nelson and Son.

The Inspector asked no question respecting the age of any child in the school.

Arithmetic.

STANDARD I.

1. 495, 37, 410, 8, 950 — 1,900

2. 957, 283 — 674

3. 701, 84 — 617

STANDARD II.

1. 63,014 ÷ 8. Ans. 7,876 + 6.
2. 12,648 × 365. Ans. 4,616,520.
3. 19,019 + 843,600 + 47 + 12,009. Ans. 874,675.
4. 70,094 — 9,086. Ans. 61,008.

STANDARD III.

1. A girl had a five-pound note. In the first shop she spent 3s. 6d.; in the second 7s. 10½d.; and in the third 2s. 6d. How much had she left? Ans. £4 6s. 1½d.

2. Find the difference between £429 14s. 2¾d. and £735 12s. 0½d. Ans. £305 17s. 9¾d.

3. Divide forty-eight thousand three hundred and forty by seventy-nine. Ans. 611 + 71.

4. Find the sum of £654 13s. 3½d.; £66 6s. 6¾d.; 19s. 0½d.; £9 12s. 0¼d.; £937 17s. 7¾d. Ans. £1,669 8s. 7d.

STANDARD IV.

1. How many seconds are there in the months of September and December? Ans. 5,270,400 seconds.

2. How many half-ounces of tobacco can be weighed from a load of 9 tons 7 lbs.? Ans. 645,314 half-ozs.

3. Multiply £211 12s. 3½d by 53. Ans. £11,215 10s. 4½d.

4. A man bought turkeys for £83 18s. 6½d.; this included railway carriage, which was 16s. 3½d. Each turkey cost 7s. 7½d. How many did he buy? Ans. 218 turkeys.

STANDARD V.

1. An ironmonger made a profit of £72 3s. 4d. on an outlay of £360 18s. What amount of profit ought he to make on £505 1s.? Ans. £101 0s. 8d.

2. What will 2,914 sheep cost at £3 4s. 11d. per head? Ans. £9,458 7s. 2d.

3. Simplify: $\frac{3}{4} + \frac{2}{5} - \frac{1}{8} + \frac{3}{8} - \frac{1}{5}$. Ans. $\frac{23}{40}$.

4. What would be left out of half of a five pound note after paying the following bill?

	£	s.	d.
7 half pounds tea at 3s. 6d. per lb. ...	0	12	3
11 lbs. coffee at 1s. 7½d. per lb. ...	0	17	10½
5½ lbs. butter at 1s. 3d. per lb. ...	0	6	10½
30 eggs at 6 for 5d.	0	2	1
7 tins salmon at 7½d. per tin. ...	0	4	4½
	2	3	5½

Ans. 6s. 6½d.

STANDARD VI.

1. If 22¾ lbs. of butter cost £1 12s. 8d., what ought 68¼ lbs. to cost? Ans. £4 18s.

2. Find the simple interest on £1 13s. 4d. for 8¼ years at 2½ per cent. Ans. 6s. 10½d.

3. How many fifths of a ton must be added to half a ton to make it $\frac{9}{10}$ of a ton? Ans. $\frac{2}{5}$.

4. Simplify:—

$$\frac{1{\cdot}5 \times 7{\cdot}3}{{\cdot}75} \times \frac{{\cdot}005}{15}$$

Ans. ·00486.

STANDARD VII.

1. I bought £1,000 Stock when it stood at 97⅜ per cent., and sold out when it had risen to 101¼ per cent. How much did I gain? Ans. £38 15s.

2. Simplify—

$$\frac{\frac{3}{5} + \frac{3}{4} - \frac{5}{8}}{\frac{3}{4} \times 3\frac{1}{3} \times \frac{4}{9}} \times \left(\frac{5}{7} - \frac{3}{5}\right).$$

Ans. $\frac{208}{3150}$.

3. A, B, and C had £4 10s. to divide between them; A had 10s. more than B, and B had half as much as C. How much did each receive? Ans. A, £1 10s.; B, £1; C, £2.

4. Find the value of ·2$\dot{7}$ of £3 + ·9 of 5s. + ·$\dot{3}\dot{7}$ of 8s. 3d. How many herrings at 4 for 3d. could be bought with the money? Ans. £1 4s. 9d.; 396.

(To be continued.)

Query Column.

Arithmetic.

1. LANGFORD.—A certain number was multiplied by 225, and in the product (expressed by 4 figures) the hundred's figure (considering local value) was 24 times the number represented by the unit's and ten's figures together. Find the product.

As the ten's and unit's figures in the multiplier are 25, therefore the ten's and unit's figures in the product must be 00, 25, 50, or 75.

In the second case where the two figures are 25, we find that $25 \times 24 = 600$, therefore hundred's figure would be 6.

The third and fourth cases are inapplicable, as the hundreds would be represented by two figures if they were multiplied by 24.

∴ Three of the figures in the product = 625.

Now $625 \div 25 = 25$,

And $25 \times 200 = 5{,}000$;

∴ If the multiplicand is 25 we shall have 625 in the product.

∴ Product $= 25 \times 225$

$= \underline{5{,}625}$. Ans.

2. B. G.—A man invests £14,970 in the purchase of Three per Cents. at 90, and of Three-and-a-Quarter per Cents. at 97. His total income being £500, how much did he invest in each stock? (*Hamblin Smith.*)

Income if total amount was invested in the Three per Cents. at 90

$$= \frac{\overset{499}{\cancel{14970}} \times 3}{\underset{3}{\cancel{90}}} £$$

$= £499$;

Difference between this income and income received

$= £500 - £499$

$= £1$;

Difference in income for £1 invested in the two stocks

$= \left(\frac{3\frac{1}{4}}{97} - \frac{3}{90}\right)£$

$= (\frac{13}{388} - \frac{1}{30})£$

$= \frac{195 - 194}{5820}£$

$= \frac{1}{5820}£$;

∴ Sum invested in the Three-and-a-Quarter per Cents. at 97

$= (1 \div \frac{1}{5820})£$

$= £5{,}820$;

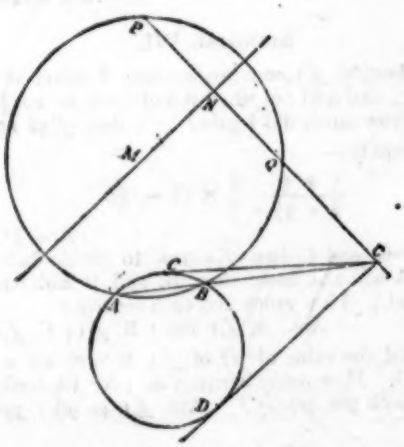
Sum invested in the Three per Cents. at 90

$= £14{,}970 - £5{,}820$

$= \underline{£9{,}150}$.

General.

1. W. H. M.—To describe a circle which shall pass through a given point, shall have its centre in a given straight line, and shall be tangential to a given circle.



Let P be the given point, MN the line on which the centre is to lie, ACB the given circle.

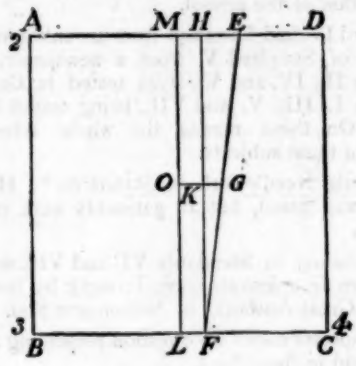
Draw PN perpendicular to MN and produce it, making NQ = PN and indefinitely beyond Q. Draw any circle whatever through PQ, meeting the given circle in two points A, B. Produce AB to meet PQ in O. From O draw OC, OD tangents to the given circle. Then the circles drawn round PQC or PQD shall either of them satisfy the required conditions.

For, first, they have their centres on NM, for PN = NQ and PQ is perpendicular to NM.

Next, they touch ACB, for $OC^2 = OD^2 = OA.OB = OP.OQ$.

2. DYER.—Find the centre of inertia of four particles 2, 3, 4, 5, placed at the corners of a horizontal square, side 6 inches.

Does the construction hold if the square be inclined to the horizon? (*Taylor's* 'Mechanics.')



Let E be centre of gravity of particles 2 and 5,

Then $DE = \frac{2}{2+5}$ or $\frac{2}{7}$ of AD, or $\frac{2}{7}$ of side of square.

Let F be centre of gravity of particles 3 and 4,

Then $CF = \frac{3}{7}$ of side of square.

Join EF, and bisect it in G;

Then G is the centre of gravity or centre of inertia of the four particles.

Draw FH parallel to sides, also LM from the middle point of BC parallel to the sides.

Draw GO parallel to AD, cutting FH in K.

Then GO is the distance of the centre of inertia from the centre of the square.

$EH = CF - DE$

$= (\frac{3}{7} - \frac{2}{7})$ of side

$= \frac{1}{7}$ of side;

Now GK : EH = FG : FE,

and FG is half of FE,

∴ GK = half of EH

$= \frac{1}{2}$ of $\frac{1}{7}$ of side

$= \frac{1}{14}$ of side;

$KO = FL = CL - CF$

$= (\frac{1}{2} - \frac{3}{7})$ of side

$= \frac{1}{14}$ of side;

∴ GO $= (\frac{1}{14} + \frac{1}{14})$ of side

$= \frac{1}{7}$ of side.

∴ Distance of centre of inertia from centre of square $= \frac{1}{7}$ of 6 in.

$= \underline{\frac{6}{7}}$ in. Ans.

Note.—It is evident that the construction holds whatever the position of the square.

No. 12.

1. 14 acres 3 rds. 24 poles at £52 7s. 6d. per acre.
2. Reduce $\frac{7}{10}$, $\frac{5}{7}$, $\frac{4}{5}$, $\frac{1}{2}$ to fractions of the same denomination.
3. How long would 48 guineas last a man if he spent 84s. every three days?
4. Make a bill for:—
   15¼ cwt. at £20 per ton.
   14 lbs. at 3¾d. per lb.
   1 barrel at 8½d. per gallon.
   19¼ yds. at 7d. per yard.
   12 pairs at 6s. 3d. per pair.

No. 13.

1. 595 cub. yds. 24 cub. feet 1,512 cub. inches at £967 12s. 8d. per cubic yard.
2. 8,469 articles at £39 16s. 9½d. each.
3. If a man earns £383 5s. in 365 days, in what time will he earn 30 guineas?
4. Make a bill for:—
   11 pairs of boots at 11s. 6d. per pair.
   1½ gross at 1s. 9d. per dozen.
   64 bottles of wine at 5s. 6d. per bottle.
   15 pints at 4s. 10½d. per quart.
   37 reels of cotton at 1¼d. each.

No. 14.

1. 74 cwt. 3 qrs. 13 lbs. 10 ozs. at £9 9s. per cwt.
2. 5,771 articles at £24 15s. 7¾d. each.
3. How many yards at 7s. 3d. per yard must be given for 1,871 yards at 36s. 3d. per yard?
4. Make a bill for:—
   4 dozen oranges at 2 for 1½d.
   7¼ lbs. of biscuits at 8d. per lb.
   1¾ lbs. of sweets at 1¼d. per oz.
   6 cakes at 3s. 3d. each.
   14 lbs. of ham at 2s. 1d. per lb.

No. 15.

1. 409 miles 7 fur. 23 poles at £409 15s. 6d. per mile.
2. 6,904 articles at £409 13s. 7½d. each.
3. If 17 cwt. 3 qrs. 7 lbs. cost £35, what weight could I get for £14?
4. Make a bill for:—
   5 dozen at 5 for 5d.
   19 ozs. at 3¼d. per oz.
   13¾ lbs. at 10d. per lb.
   ¾ lb. of tea at 4d. per oz.
   19 dishes at 2s. 2d. each.

ANSWERS.

No. 1.

1. £1,337 5s. 0d.
2. £251,360 12s. 8d.
3. 19s.
4. £0 15s. 11½d.
   £1 5s. 5½d.
   £1 6s. 11d.
   £0 18s. 9d.
   £1 16s. 0d.
   £6 3s. 0½d.

No. 2

1. £39,827 15s. 0½d.
2. £189,261 7s. 6d.
3. 16⅜ cwts.
4. £1 10s. 5⅞d.
   £0 3s. 6d.
   £4 1s. 0d.
   £8 2s. 0d.
   £2 5s. 0d.
   £16 1s. 11¾d.

No. 3.

1. £839 14s. 4½d.
2. 1/9.
3. £10 10s. 0d.
4. £ 7 7s. 0d.
   £ 0 13s. 1½d.
   £18 2s. 6d.
   £ 2 15s. 0d.
   £ 0 12s. 11½d.
   £29 10s. 6½d.

No. 4.

1. £2,177 7s. 3½d.
2. £4,616,853 5s. 9d.
3. 15$\frac{5}{11}$ hours.
4. £1 4s. 11¼d.
   £1 13s. 4d.
   £1 7s. 0½d.
   £0 2s. 6d.
   £0 6s. 0½d.
   £4 13s. 10d.

No. 5.

1. £46,256 15s. 1$\frac{3}{10}$d.
2. £76,904 9s. 5¼d.
3. £758 0s. 6½d.
4. £1 5s. 6d.
   £0 4s. 1d.
   £0 19s. 3d.
   £0 18s. 9d.
   £0 15s. 7d.
   £4 5s. 5½d.

No. 6.

1. £57,489 7s. 0d.
2. Greatest $\frac{3}{4}$, least $\frac{4}{5}$.
3. £13 10s. 0d.
4. £42 15s. 6d.
   £ 1 1s. 3½d.
   £44 2s. 0d.
   £ 2 8s. 2d.
   £ 2 10s. 9d.
   £92 17s. 6½d.

No. 7.

1. £744 9s. 11$\frac{3}{14}$d.
2. $\frac{28, 60, 126, 105}{140}$
3. £189 3s. 11¼d.
4. £ 0 10s. 0d,
   £ 2 13s. 0½d.
   £ 0 4s. 9d.
   £ 2 15s. 3d.
   £ 6 4s. 0d.
   £12 7s. 0½d.

No. 8.

1. £37,464 4s. 7½d.
2. 1$\frac{19}{20}$.
3. 110$\frac{1}{3}$ weeks.
4. £0 5s. 7½d.
   £0 10s. 6½d.
   £0 7s. 0d.
   £1 6s. 1½d.
   £0 1s. 3d.
   £2 10s. 6½d.

No. 9.

1. £397,172 7s. 1$\frac{7}{8}$d.
2. £4,542,167 8s. 7½d.
3. 20$\frac{1}{2}$ lbs.
4. £0 1s. 0d.
   £0 4s. 0d.
   £0 8s. 4d.
   £1 13s. 3d,
   £0 4s. 4½d.
   £2 10s. 11½d.

No. 10.

1. £59,214 19s. 8½d.
2. £6,660,594 18s. 0d.
3. £406 8s. 0d.
4. £0 17s. 6d.
   £0 10s. 8½d.
   £0 5s. 0d.
   £0 10s. 4d.
   £2 14s. 4½d.
   £4 17s. 10½d.

No. 11.

1. £18,528 1s. 4½d.
2. 1$\frac{13}{196}$.
3. £92 8s. 2½d.
4. £ 1 17s. 6d.
   £ 1 1s. 0d.
   £42 1s. 0d.
   £ 0 5s. 0d.
   £ 0 5s. 0d.
   £45 9s. 6d.

No. 12.

1. £780 7s. 9d.
2. $\frac{189, 180, 504, 70}{630}$
3. 36 days.
4. £15 5s. 0d.
   £ 0 4s. 4½d.
   £ 1 5s. 6½d.
   £ 0 11s. 2½d.
   £ 3 15s. 0d,
   £21 1s. 1½d.

No. 13.

1. 576,633 6s. 2$\frac{1}{2}$$\frac{3}{0}$d.
2. £337,401 8s. 7½d.
3. 30 days.
4. £ 6 6s. 6d.
   £ 1 11s. 6d.
   £17 12s. 0d.
   £ 1 16s. 6½d.
   £ 0 3s. 10½d.
   £27 10s. 5d.

No. 14.

1. £707 10s. 8½d.
2. £143,018 12s. 1¼d.
3. 9,355 yards.
4. £0 3s. 0d.
   £0 4s. 10d.
   £0 2s. 11d.
   £0 19s. 6d.
   £1 9s. 2d.
   £2 19s. 5d.

15.

1. £167,985 19s. 7$\frac{45}{50}$d.
2. £2,828,439 7s. 0d.
3. 7¼ cwt. or 798 lbs.
4. £0 5s. 0d.
   £0 5s. 11½d.
   £0 11s. 5½d.
   £0 4s. 0d.
   £2 1s. 2d.
   £3 7s. 6½d.

N.B.—In our next issue will be found a complete set of Test Questions in Arithmetic for Standards I. and II. (Boys and Girls).

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The New-Born Lamb	0	6
The Blind Boy	0	6
STANDARD II.		
*The Two Parrots	0	6
*Story of a Cat	0	6
The Dog and the Knight	0	6
*Queen Bee and Busy Bee	0	6
*Gull's Crag, a Tale of the Sea	0	6
STANDARD III.		
*Grimm's Tales (Selected)	1	0
Great Englishmen (Short Lives)	1	0
*Andersen's Tales (Selected)	1	0
*Life of Columbus	1	0
STANDARD IV.		
*Great Englishwomen (Short Lives)	1	0
Great Scotsmen (Short Lives)	1	0
Edgeworth's Tales (Selected)	1	0
*Parables from Nature (Selected)	1	0
*Scott's Talisman (Abridged)	1	0
*Friends in Fur and Feathers	1	0
*Poetry for Boys	1	0
STANDARD V.		
*Dickens' Little Nell (Selected from the 'Old Curiosity Shop')	1	0
*Masterman Ready (Abridged)	1	0
*Marryat's Poor Jack (Abridged)	1	0
*Arabian Nights (Selected)	1	0
*Gulliver's Travels (Abridged)	1	0
*Vicar of Wakefield	1	0
STANDARDS VI. & VII.		
*Lamb's Tales from Shakespeare	1	0
Tales of the Coast (Runciman)	1	0
*Robinson Crusoe	1	0
*Settlers in Canada	1	0
*Life of Wellington	1	0
*Life of Nelson (Southey) (Abridged)	1	0
*Sir Roger de Coverley	1	0

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